

Draft External Assessment Resources
For planning purposes only

2



Level 2 Physics

2.6: Demonstrate understanding of electricity and electromagnetism

Credits: Six

Check that you have completed ALL parts of the box at the top of this page.

Check that you have been supplied with the resource sheet for Level 2 Physics.

You should answer ALL parts of ALL questions in this booklet.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–9 in the correct order and that none of these pages is blank.

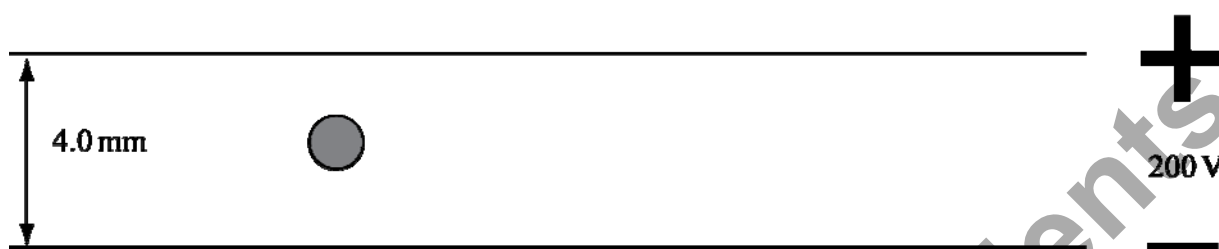
YOU MUST HAND THIS BOOKLET TO YOUR TEACHER AT THE END OF THE ALLOTTED TIME.

For Assessor's use only		Achievement Criteria	
Achievement		Achievement with Merit	Achievement with Excellence
Demonstrate understanding of electricity and electromagnetism. <input type="checkbox"/>		Demonstrate in-depth understanding of electricity and electromagnetism. <input type="checkbox"/>	Demonstrate comprehensive understanding of electricity and electromagnetism. <input type="checkbox"/>
Overall Level of Performance		<input type="checkbox"/>	

You are advised to spend 60 minutes answering the questions in this booklet.

QUESTION ONE: STATIC ELECTRICITY

The diagram below shows an electron that is introduced into the region between two parallel metal plates that are maintained at a potential difference of 200 V. The plates are separated by a distance of 4.0 mm.



(a) In terms of energy changes, describe what happens to the electron when it is:

- free to move in the electric field
- forced to move against the electric field.

- (b) The electron has a mass of 9.0×10^{-31} kg. The charge on the electron is -1.6×10^{-19} C. The electron is released from the negative plate.

Calculate the speed at which the electron reaches the positive plate as it accelerates towards it. In your answer, you should calculate the electric field strength.

- (c) Comment on the size of the force experienced by the electron as it moves from the negative plate towards the positive plate.

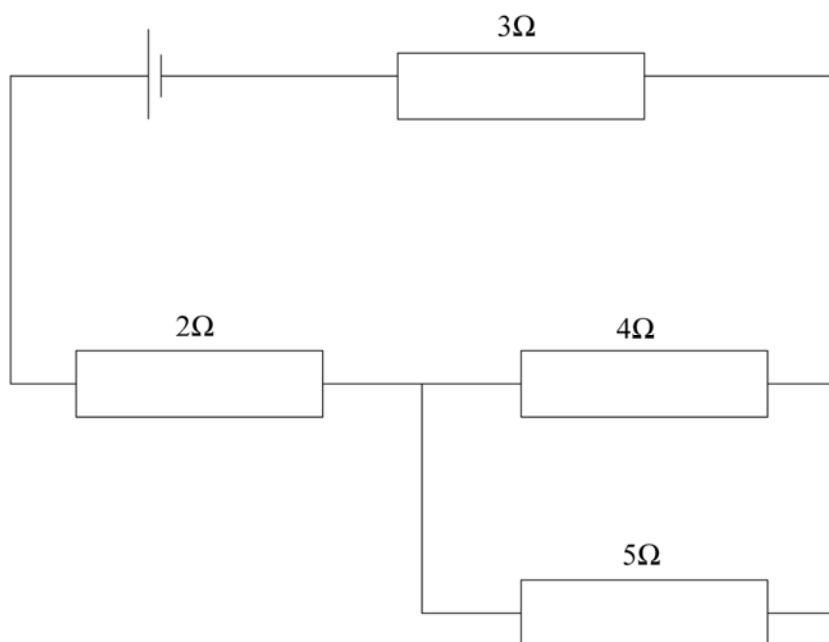
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QUESTION TWO: DC ELECTRICITYAssessor's
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The diagram below represents a circuit.



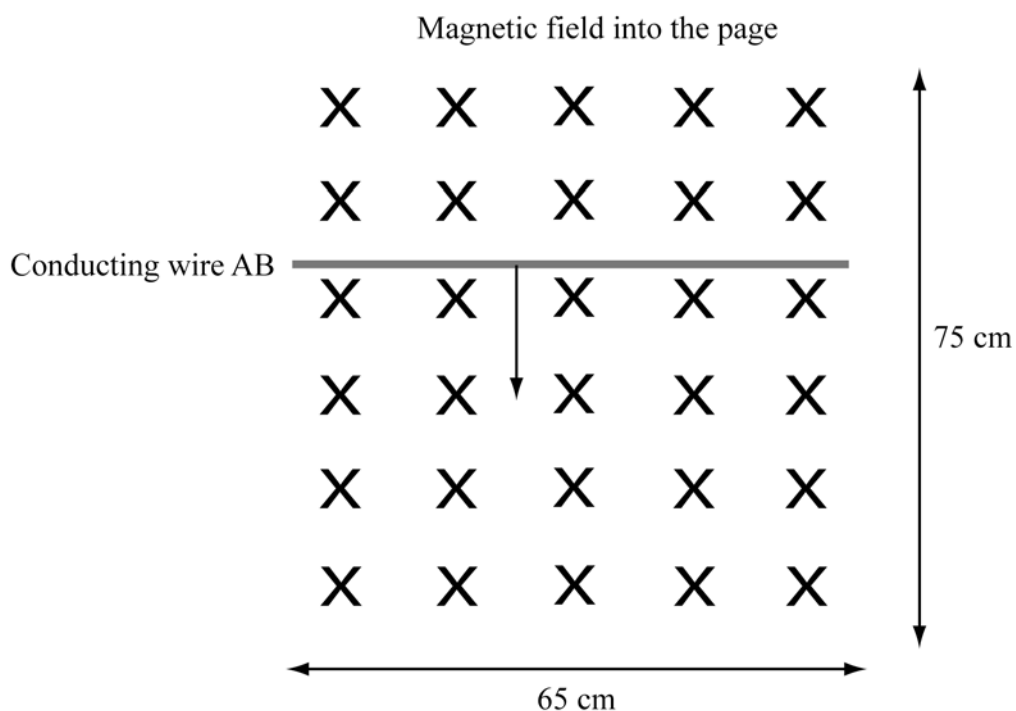
- (a) Calculate the effective resistance of the circuit.

- (b) Calculate the voltage across the 5Ω resistor. The supply voltage is 9.0 V .

- (c) Explain in detail whether the 3Ω resistor OR the 5Ω resistor will draw more power from the battery.

QUESTION THREE: ELECTROMAGNETISMAssessor's
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The conducting wire AB is moved in a magnetic field as shown in the diagram below.



Strength of magnetic field = 0.80 T

Speed with which the wire is moved = 12 ms^{-1}

Charge on electron = $1.6 \times 10^{-19} \text{ C}$

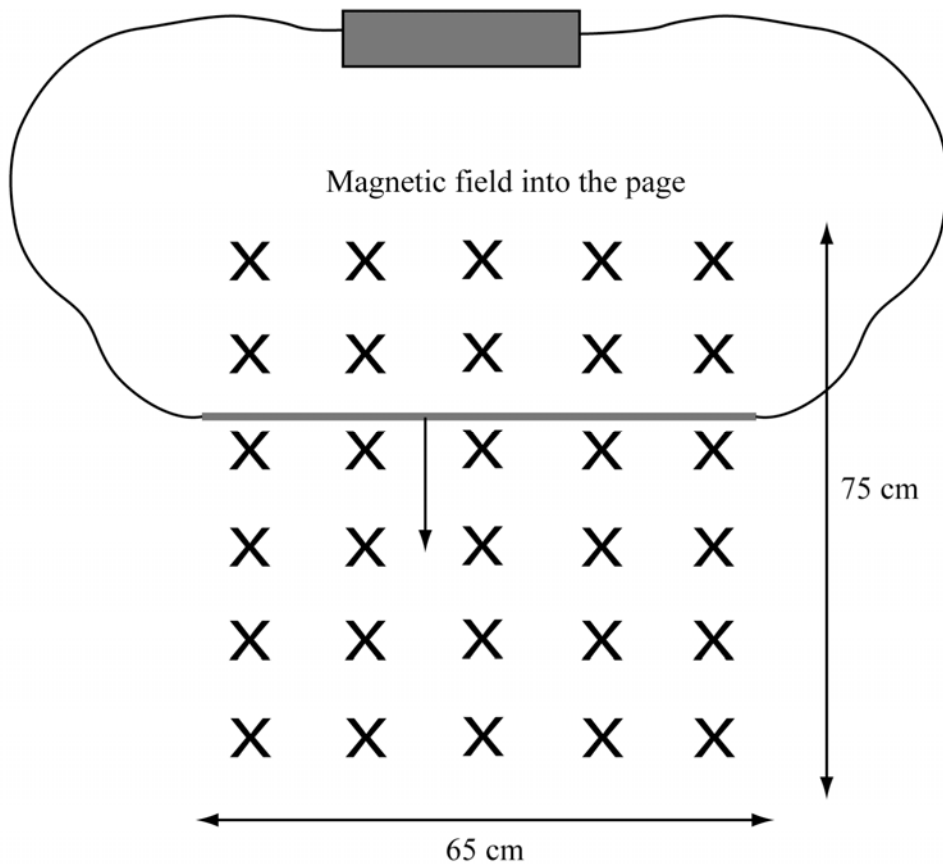
- (a) Explain in detail what happens to the electrons in the wire as the wire is moved in the magnetic field.

In your answer, you should include ideas about:

- the force(s) experienced by the electrons in the wire
- the effect of the force(s) experienced by the electrons in the wire.

- (b) Calculate the size of the induced voltage across the wire.

The wire is now connected to a resistor to make a complete circuit as shown in the diagram below.
The resistance of the resistor and the wire = $4.5\ \Omega$.



- (c) Calculate the size of the current through the resistor as the wire is being moved in the magnetic field.

Draw an arrow on the diagram above to show the direction of the current through the resistor.

Extra paper for continuing your answers, if required.
Clearly number the question.

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